

Studies in Population and Development

**No. 10-02
Transition in Age Pattern of Marital Fertility
in India: 1985-2007**

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Introduction

The evidence available through the sample registration system as well as through the National Family Health Survey indicates that fertility is declining in India, albeit at a pace slower than expected. According to the National Family Health Survey, the total fertility rate in India decreased from around 3.4 births per woman of reproductive age in 1990-92 to around 2.7 births per woman of reproductive age in 2003-05. On the other hand, information available through the sample registration system suggests that total fertility rate in India decreased from 4.3 births per woman of reproductive age in 1985 to 2.7 birth per woman of reproductive age in 2007 while the total marital fertility rate decreased from 5.6 births per currently married woman of reproductive age in 1985 to 4.4 births per currently married woman of reproductive age in 2007. Information available through the sample registration system also suggests that there has been a considerable slowdown in the total marital fertility rate in the country after 1995. Between 1985 and 1995, the total marital fertility rate decreased from 5.6 to 4.7 in 1995 but between 1995 and 2007, the total marital fertility rate decreased from 4.7 to 4.4 births per currently married woman of reproductive age. In fact, total marital fertility rate in India remained virtually stagnant during the period 1995 through 2003. There has been an abrupt decrease between 2003 and 2004 from 2.7 to 2.4 births per currently married woman of reproductive age but the decrease in the total marital fertility rate again stagnated during the period 2004 through 2007.

It is obvious to conjecture that the decrease in fertility and marital fertility in India since 1985 has been associated with changes in age patterns of fertility as well as age patterns of marital fertility. There has however been no attempt to analyse how the age pattern of fertility and age pattern of marital fertility in India have changed under the declining fertility regime. Kumar (1977) has compared fertility in India during 1951-60 with fertility in Sweden and Finland between 1871-80 and observed that the rate of reproduction within marriage in India during 1951-60 was lower than that in Sweden and Finland in the late nineteenth century because of high level of abstinence because of taboos and customs, long duration

of breast feeding, etc. However, in recent years, there has been no attempt to analyse the changes in the age patterns of fertility in India and its implications.

The age pattern of fertility is influenced by a host of factors that include: 1) marriage patterns; 2) patterns of widowhood; 3) patterns of divorce and separation; 4) distribution of females in the child bearing ages; and 5) patterns of reproduction within marriage measured by age specific marital fertility rate. The age pattern of marital fertility, on the other hand, is determined by the age pattern of reproduction within the institution of marriage only. The age pattern of marital fertility is also shaped by the orientation of fertility regulation efforts. When the prevailing wisdom is to limit the number of births, child bearing is concentrated in younger ages of the reproductive period. Once, couples achieve their desired family size, efforts are made to prevent further births so that marital fertility declines sharply in the older ages of the reproductive period.

Henry (1961) has discovered that in populations where there is little or no voluntary or deliberate control of fertility, the age pattern of fertility within marriage is approximately constant. Voluntary or deliberate control of fertility, according to Henry, is any behaviour affecting fertility that is modified as parity in creases. He termed fertility in the absence of voluntary or deliberate control as the 'natural fertility' and observed that, although, natural fertility varied across populations, yet its age pattern remained the same. Henry did not include, in his analysis, the situation in which couples deliberately attempt to space births but are not concerned with the number of children that are ultimately born. Laridon (1975) extended the definition of natural fertility in situations where couples do not consciously attempt to regulate or space the number of children. It has been observed in Indonesia and Nigeria that couples deliberately space births in the context of survival of children and health of women and children but not in the context of regulation of fertility (Calwell and Caldwell, 1977). In India also, the official family planning programme, introduced way back in 1952, had its rooting in improving the health of women and children and not in the reduction of fertility.

Following the work of Henry, Coale and Trussell (1974) proposed a model that, by generalising the pattern of natural fertility, was able to represent the fertility experience of populations where voluntary control of fertility was exercised. The model was based on the assumption that marital fertility either follows the natural fertility (if deliberate fertility regulation is not practised) or it departs from the natural fertility in a way that increases with age according to a typical pattern (United Nations, 1983). Coale and Trussell used this model in developing model fertility schedules that depicted variations in the age structure of child bearing in human populations at different levels of fertility. The parameter 'm' of the Coale and Trussell fertility model has widely been used as an indicator of the extent of fertility control (Knodel, 1977; Lavelly, 1986). This indicator measures the rapidity of decline in fertility, or the extent of concavity of the age specific marital fertility curve, above ages 20-24 (Anderson and Silver, 1992).

Brass, on the other hand, has suggested a relational scheme between a ‘standard’ fertility schedule and any other fertility scheduled to model age pattern of fertility. (Brass, 1980). Brass approach basically attempts to linearise the age specific fertility curve by using a Gompertz transformation. Brass also derived an appropriate standard fertility schedule on the basis of Coale and Trussell model fertility schedules as the basis of the application of the scheme proposed by him. Booth (1984) has developed another ‘standard’ fertility schedule that is specifically been designed for high fertility populations.

In this paper, we apply the relational scheme proposed by Brass to analyse the transition in the age pattern of marital fertility in India and in its constituent states during the period 1985 through 2007. The paper also discusses implications of the observed transition in the age pattern of marital fertility in the context of population stabilisation in India.

Methodology

The methodology employed in the present paper, essentially comprises of fitting the following equation (United Nations, 1983):

$$Y_t(x) = \alpha_t + \beta_t Y_s(x) \quad (1)$$

where

$$Y(x) = -\ln(-\ln(F(x)/TF)), \quad (2)$$

and $F(x)$ is the cumulative fertility up to age x and TF is the total fertility rate. Here the subscript t stands for time and s stands for ‘standard’ fertility schedule.

The parameters α and β of the model has the following interpretation: α can be taken as the age location of fertility schedule or, more specifically, the age by which half of the total child bearing has occurred. On the other hand, β may be interpreted as determining the spread or degree of concentration of the fertility schedule (United Nations, 1983). When $\alpha=0$ and $\beta=1$, the age patterns of $Y(x)$ and $Y_s(x)$ are the same. When $\alpha < 0$, half of the total childbearing occurs at an older age than the standard and vice versa. Similarly, when $\beta > 1$, the observed age pattern of fertility is steeper than the standard age pattern and vice versa. This implies that an analysis of the trend in parameters α and β facilitates the analysis of transition in the age pattern of marital fertility.

An important consideration in the application of the above approach is the selection of the standard marital fertility schedule. One approach, obviously, is to use the natural fertility schedule developed by Coale and Trussell as the standard for the present analysis. The second approach may be to treat the age specific marital fertility rate in India and in its constituent states around 1985 as the standard. In fact, if $Y_n(x)$ is the transformation of natural fertility schedule and $Y_s(x)$ stands for the transformation of marital fertility schedule that prevailed in India around 1985, then

$$\begin{aligned} Y_t(x) &= \alpha_t + \beta_t Y_s(x) \\ \text{and} \quad Y_s(x) &= \eta + \theta Y_n(x) \\ \text{so that} \quad Y_t(x) &= \alpha_t + \beta_t (\eta + \theta Y_n(x)) \\ &= (\alpha_t + \beta_t \eta) + \beta_t \theta Y_n(x) \end{aligned} \quad (3)$$

In view of the above considerations, we have opted for taking the age specific marital fertility rate that prevailed in India and in its constituent states around the year 1985 as standard for analysing relative changes in the age pattern of marital fertility between 1985 and 2007. More specifically, we explore how age pattern of mortality has changed in the country and its constituent states between 1985 and 2007.

Data Source

The analysis is built upon annual estimates of age specific marital fertility rates available through the Sample Registration System. Sample Registration System is the only source which provides annual estimates of age specific marital fertility rates in India and in its major states. Estimates of marital fertility are not available through the National Family Health Survey. Estimates of marital fertility may also be derived from children ever born data collected during the decennial population census. However, estimates based on the information available through the population census are not available on an annual basis.

Estimates available through the Sample Registration System are generally believed to be quite accurate, although there is some under reporting of vital events under the system which varies from state to state. An investigation carried out in 1980-81 about the reliability of different demographic indicators derived through the Sample Registration System suggested an omission rate of 3.1 per cent for births at the all India level (Government of India, 1983). Another enquiry conducted in 1985 suggested that omission rate had decreased to 1.8 per cent for births, although omission rates varied from state to state (Government of India, 1988). Recently, Mari Bhat has estimated that the Sample Registration System has missed about 7 per cent of the births through the application of an indirect approach. Mari Bhat has also concluded that there has been no substantial change in the completeness of the reporting of births under the System, although some improvements in the accuracy of data appears to have taken place in some states of the country (Mari Bhat, 2002). These improvements might have resulted in a slight underestimation of the pace of fertility decline at the national level. However, the extent of improvement in birth reporting appears to be too small to have any significant impact on the medium term trend in the birth rate.

Estimates of demographic indicators available through the system are known to be associated with year-to-year fluctuations primarily due to non-sampling errors of unknown origin. Any analysis of the trend in demographic indicators available through the System, therefore, requires elimination of these year-to-year random fluctuations. The normal practice that is used to minimise these annual random fluctuations of unknown origin is to use three-year moving averages, centred at the middle year of the three-year period, instead of annual estimates. The same practice has been adopted in this paper too. For example, the estimate of birth rate for the year 1986 is actually the un-weighted average of birth rates for the years 1985, 1986 and 1987.

Marital Fertility in India

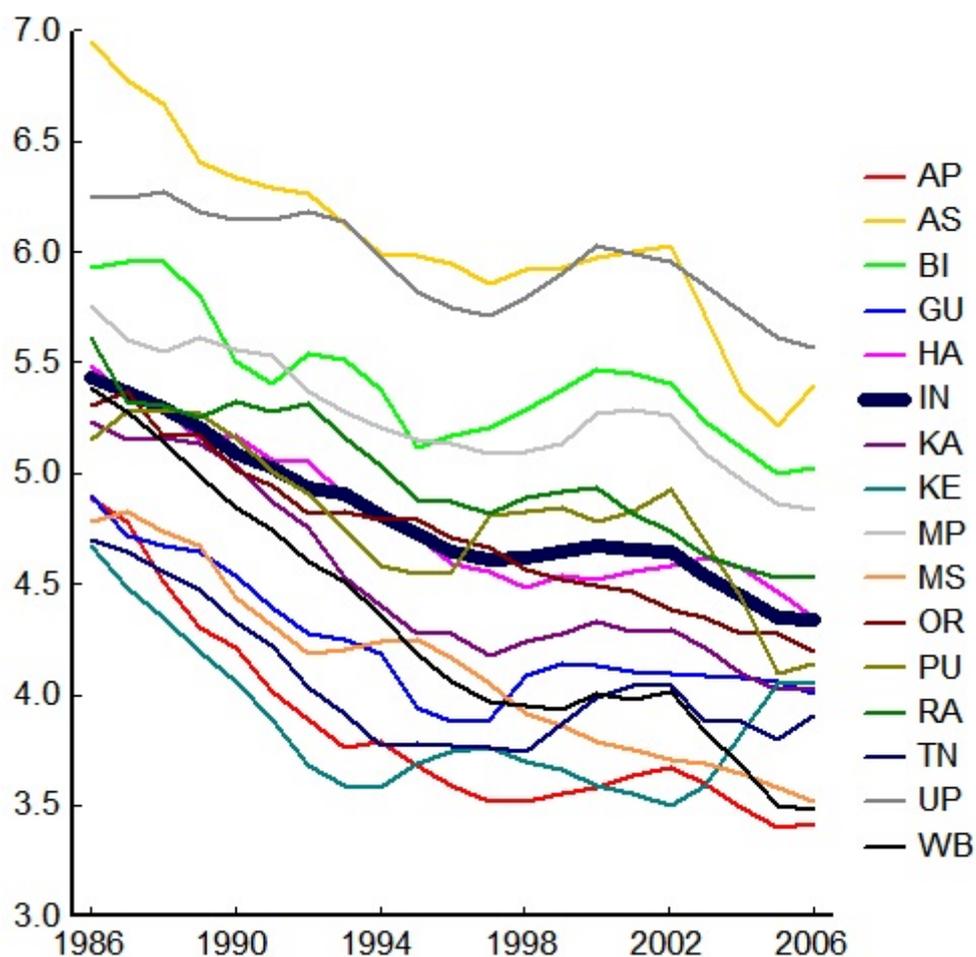
Estimates of total marital fertility rate for India and its constituent states are given in table 1. In India, total marital fertility rate decreased from around 5.4 births per currently married woman of reproductive age during 1985-87 to around 4.3 births during 2005-07. The decrease has however not been uniform (Figure 1). The decrease in total marital fertility stagnated during the period 1995-97 through 2001-03 and again in the recent years.

Among different states of India, total marital fertility rate varies widely currently as well as in the past. During the period 1985-87, total marital fertility rate was the highest in Assam and the lowest in Kerala. Twenty years later, Uttar Pradesh had the highest total marital fertility rate of around 5.6 birth per currently married woman of reproductive age while Andhra Pradesh had the lowest the total marital fertility rate of around 3.4 births per currently married woman of reproductive age. The path of transition in marital fertility has also been different in different states. The decrease in the total marital fertility rate has been the slowest in Uttar Pradesh but the fastest in Andhra Pradesh.

Despite the decrease in the total marital fertility rate, a currently married woman was producing more than 4 children, on average, during her reproductive period according to fertility levels that prevailed in the country around 2005-07. There was only one state, Andhra Pradesh, where this number was less than 3.5. Obviously fertility control efforts in India and in most of the states have not been very effective in regulating fertility. There has been a decrease in the total marital fertility rate but this decrease has been substantially slower than what was expected or desired. By international standards, marital fertility in India still remains high with the result that the goal of replacement fertility still remains elusive for the country.

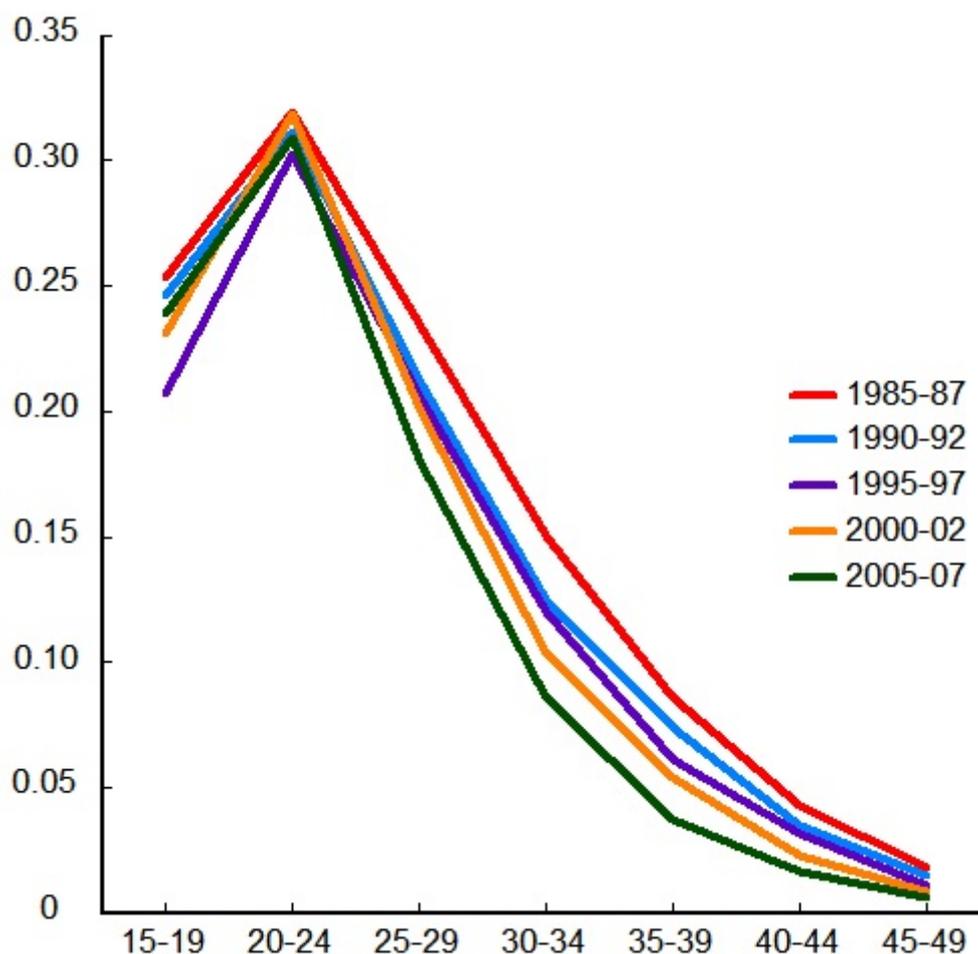
Table 2 gives estimates of age specific marital fertility rates in India during the period 1985-87 through 2005-07 as estimated through the sample registration system. These rates contain an outline of the history of marital fertility transition in India during the 20 years between 1985-87 and 2005-07. The trend in the age specific marital fertility rates in India is shown in figure 2 from which it is evident that marital fertility rates in women aged 25 years and above has decreased during the period under reference but there appears little decrease in marital fertility rates of younger women - women less than 25 years of age. This observation is also supported by the trend analysis. Although the trend analysis suggests that marital fertility rate has decreased in all age groups during the period under reference, yet the trend growth rate has not been found to be statistically significant in the age groups 15-19 years and 20-24 years ($p > .01$). The trend growth rate has been found to be statistically significant only in currently married women aged 25 years and above. In addition, the regression line accounted for only a small proportion of variation in marital fertility rates in the age group 15-19 and 20-24 years but almost all variation in the age group 25-29 years and above. Obviously, nearly all the decline in marital fertility in India during the 20 years under reference has been confined to the decline in marital fertility of women age 25 years and above.

Figure 1
Trends in total marital fertility rates
India and States
1985-2007



Source: Annual Reports of the Sample Registration System for different years.
 Remarks: 1. The total marital fertility rates shown in the figure are the unweighted average of three-year period. For example, the year 1986 shown in the figure actually refers to the period 1985-87. Similarly, the year 2006 refers to the period 2005-07.
 2. Bihar (BI), Madhya Pradesh (MP) and Uttar Pradesh (UP) were divided in the year 2000. Rates for the year 2004 onwards are related to the divided states whereas rate prior to the year 2004 are for undivided states.

Figure 2
Age specific marital fertility rates
India: 1985-2007



Source: Annual Reports of the Sample Registration System for different years.

- Remarks:
1. Fertility rates shown in the figure are the unweighted average of three-year period. For example, the year 1986 shown in the figure actually refers to the period 1985-87. Similarly, the year 2006 refers to the period 2005-07.
 2. Bihar (BI), Madhya Pradesh (MP) and Uttar Pradesh (UP) were divided in the year 2000. Rates for the year 2004 onwards are related to the divided states whereas rate prior to the year 2004 are for undivided states.

A similar situation prevailed in most of the states of the country (Table 3). There are only three states - Maharashtra, Orissa and Tamil Nadu - where there has been a significant decrease in the age specific marital fertility rate in the age group 15-19 years. On the other hand, in Bihar, Haryana, Madhya Pradesh, Rajasthan and Uttar Pradesh, the age specific marital fertility rate in the age group 20-24 years actual increased during the period under reference. By contrast, marital fertility in the age group 25-49 years decreased in all states of the country and the trend rate of decrease was statistically significant in all age groups and in all states except in the age group 45-49 years in Assam. Clearly, the transition in marital fertility in the age group 15-24 years has been radically different from the transition in marital fertility in the age group 25-49 years.

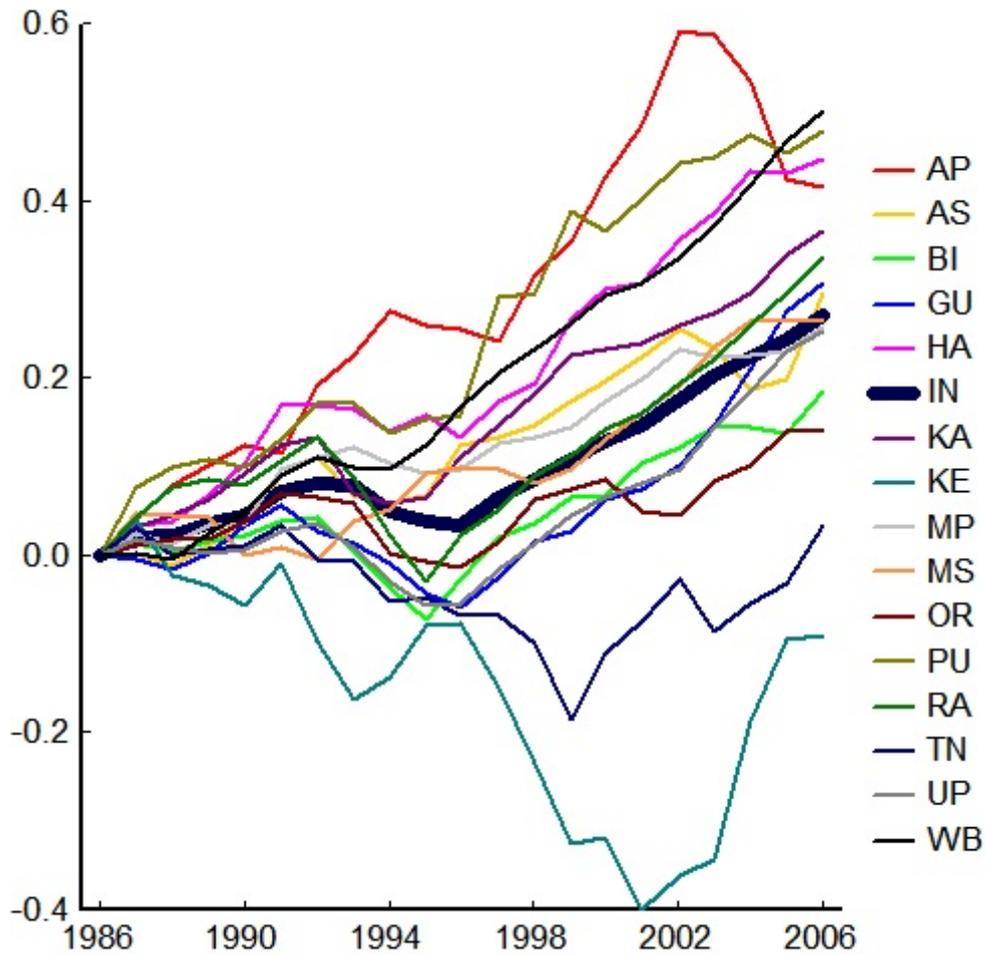
Age Pattern of Marital Fertility

Estimates of parameters α and β of model (1) for India and for its constituent states are given in tables 4 and 5 while the mean age of child bearing of currently married women is given in table 6. The trend in α and β as well as the trend in the mean age of child bearing of currently married women is depicted in figures 3, 4 and 5. The parameter α has increased over time in the country as well in its constituent states. This implies that the age by which half of the fertility occurs is decreasing over time. This observation is supported by the decrease in the mean age at child bearing of currently married women. In India, mean age at child bearing decreased by almost 2 years from between 1985-87 and 2005-07 indicating that fertility is increasingly concentrated in the younger ages.

On the other hand, parameter β is increasing in the country and in most of the states. This implies that fertility of the currently married women is increasingly getting concentrated around its age location. These observations are in line with the trend in the age specific marital fertility rates which suggests that nearly all the decrease in marital fertility has been confined to married women with at least 25 years of age. There has been little change in fertility of currently married women aged less than 25 years of age and in many states, in fact, fertility of currently married women below 25 years of age has increased over time.

The trends in parameters α and β reflect the typical fertility control regime pattern that prevails in India. This regime emphasises on birth limitation rather than birth spacing and is characterised by producing desired number of children quickly after marriage and then stopping reproduction. The regime evolved because of the official family welfare programme which has focussed on birth limitation rather than birth spacing. Latest estimates from the National Family Health Survey suggests that 37.3 per cent currently married women and 1.0 per cent men in the reproductive age group in India were sterilised. By contrast, only around 10 per cent couples were using spacing methods to regulate their fertility. A similar situation prevailed in the constituent states of the country also. In Andhra Pradesh, for example, almost two third of currently married couples of reproductive age group were found to be sterilised around the period 2005-06 whereas the prevalence of spacing methods of contraception was only 1.4 per cent.

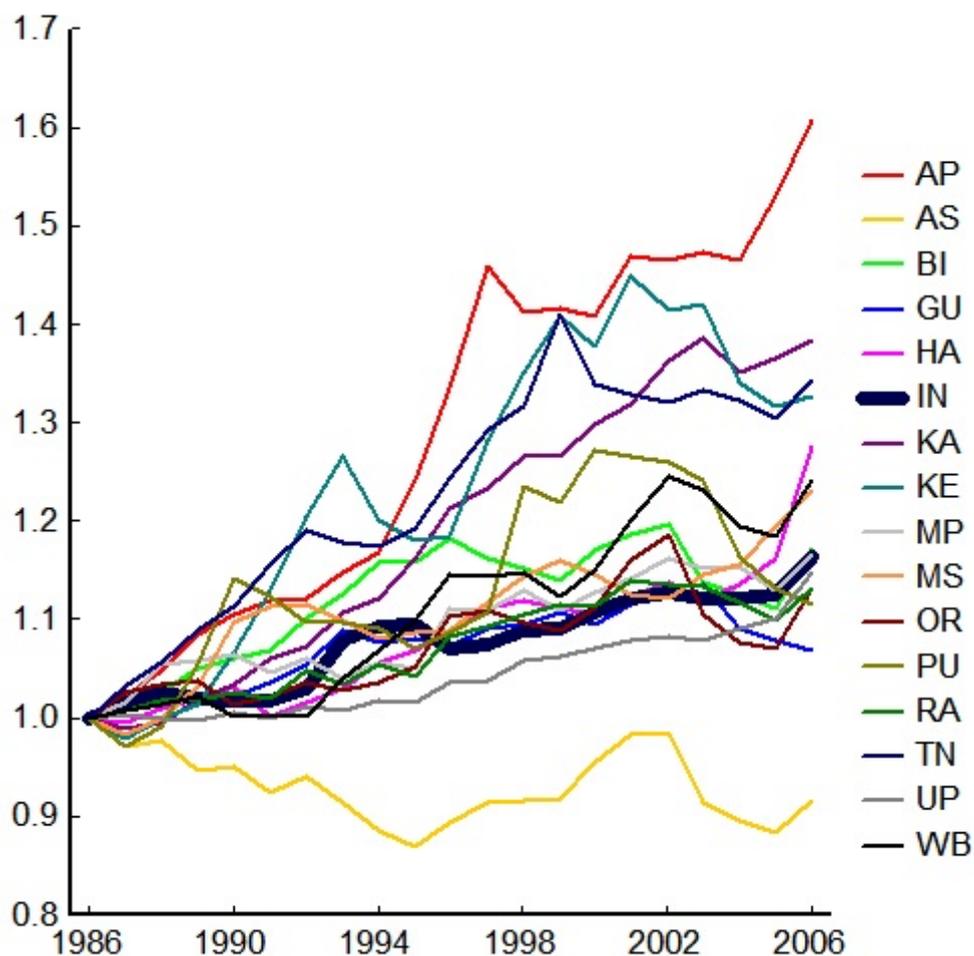
Figure 3
Trends in parameter α



Source: Author's calculations based on Annual Reports of the Sample Registration System for different years.

- Remarks:
1. Fertility rates used for estimation are the unweighted average of three-year period. For example, the year 1986 shown in the figure actually refers to the period 1985-87. Similarly, the year 2006 refers to the period 2005-07.
 2. Bihar (BI), Madhya Pradesh (MP) and Uttar Pradesh (UP) were divided in the year 2000. Rates for the year 2004 onwards are related to the divided states whereas rate prior to the year 2004 are for undivided states.

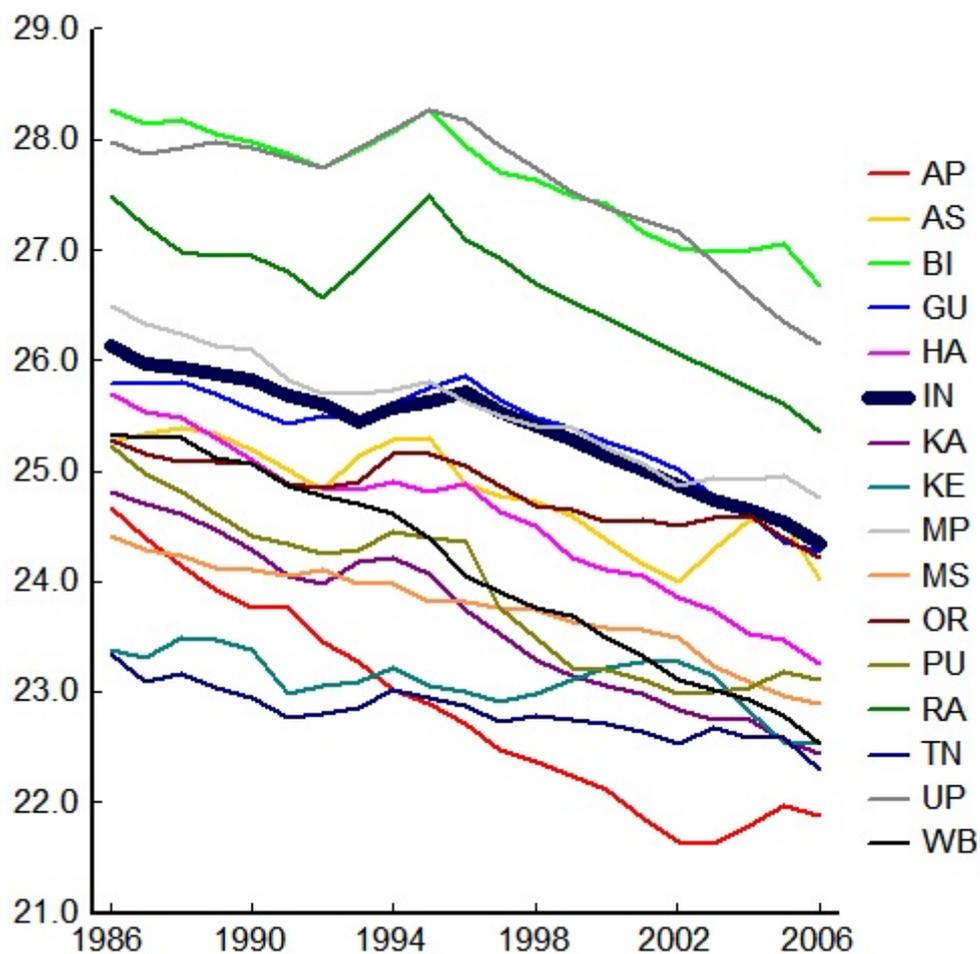
Figure 4
Trend in parameter β



Source: Author's calculations based on Annual Reports of the Sample Registration System for different years.

- Remarks:
1. Fertility rates used for estimation are unweighted average of three-year period. For example, the year 1986 shown in the figure actually refers to the period 1985-87. Similarly, the year 2006 refers to the period 2005-07.
 2. Bihar (BI), Madhya Pradesh (MP) and Uttar Pradesh (UP) were divided in the year 2000. Rates for the year 2004 onwards are related to the divided states whereas rate prior to the year 2004 are for undivided states.

Figure 5
Trend in mean age at child bearing



Source: Author's calculations based on Annual Reports of the Sample Registration System for different years.

- Remarks:
1. Fertility rates used for estimation are unweighted average of three-year period. For example, the year 1986 shown in the figure actually refers to the period 1985-87. Similarly, the year 2006 refers to the period 2005-07.
 2. Bihar (BI), Madhya Pradesh (MP) and Uttar Pradesh (UP) were divided in the year 2000. Rates for the year 2004 onwards are related to the divided states whereas rate prior to the year 2004 are for undivided states.

Conclusions

The pattern of marital fertility transition in India and in its constituent states, as reflected from the analysis presented in this paper, has important implications for population stabilisation. It is clear from the foregoing analysis that transition in marital fertility in India continues to be oriented towards fertility control, an important component of which is the eliminating unwanted fertility. It is however well known that even when fertility is brought down to the replacement level with constant mortality and zero migration, population growth will continue because of the young population structure (Bongaarts and Bulatao 1999) as the young population keeps the birth rate high even if replacement fertility is achieved. This age structure effect is termed as population momentum (Keyfitz 1971, 1985). Because of the population momentum, there is a time lag between achieving replacement fertility and levelling off the rate of natural increase or achieving population stabilisation. Once the replacement fertility is achieved, it takes about the average life expectancy for the age structure of the population to stabilise. The significance of population momentum may be judged from the observation that nearly half of the projected population growth in the world in the current century will be the result of population momentum (Bongaarts 1994; Bongaarts and Bulatao 1999).

Population momentum is now a major component of the future population growth in India. Chaurasia and Gulati (2008) have observed that the constituent states of India can be grouped into three categories on the basis of the prevailing levels of the total fertility rate - states where replacement fertility has already been achieved; states which are on the verge of achieving replacement fertility; and states where fertility still remains well above the replacement level. It is estimated that population momentum will contribute substantially to future population growth so that population momentum alone will account for 50-60 per cent of the increase in India's population in the first quarter of the current century.

One option to reduce population momentum is to raise the mean age of child bearing (Bongaarts 1994). It has been observed that fertility in a given year is significantly affected by shifts in the timing of births. When childbearing starts at an early age and spacing between successive births is small, fertility temporarily rises. Ryder (1980) has concluded that much of the temporary rise in fertility in the United States of America during the 1950s was caused by changes in the timing of fertility rather than by variation in the desired family size. Conversely a delay in the start of childbearing and wider spacing between successive births leads to a temporary decline in fertility and hence in the population growth rate. The transition in the starting, spacing and stopping behaviour of couples is reflected in the transition in the age structure of fertility.

Viewed in the above context, it is obvious that the transition in age pattern of marital fertility in India in the past has not been conducive to minimising the impact of population momentum on future population growth in India. The observed transition in age pattern of marital fertility has been result of the

approach of fertility limitation that has been pursued by India during the last 55 years. This approach has focussed on promoting use of permanent or terminal methods of contraception at the cost of spacing or temporary methods of family planning. Although, in recent years, there has been an emphasis on the spacing or temporary methods of family planning yet, the transition in the age pattern of marital fertility in India and in its most of the states clearly shows that the policy shift towards spacing methods of family planning has not been very effective modifying the age patterns of marital fertility which has a negative impact on future population growth.

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Table 1: Total marital fertility rates in India and states: 1985-2007.

Period	India	Andhra Pradesh	Assam	Bihar	Gujarat	Haryana	Karnataka	Kerala	Madhya Pradesh	Maharashtra	Orissa	Punjab	Rajasthan	Tamil Nadu	Uttar Pradesh	West Bengal
1985-87	5.521	4.949	6.963	6.164	4.943	5.542	5.279	4.685	5.856	4.807	5.358	5.180	5.757	4.718	6.427	5.463
1986-88	5.453	4.827	6.798	6.173	4.753	5.412	5.207	4.499	5.687	4.860	5.413	5.312	5.452	4.660	6.413	5.344
1987-89	5.373	4.546	6.693	6.167	4.706	5.351	5.215	4.364	5.621	4.760	5.211	5.312	5.429	4.565	6.443	5.211
1988-90	5.278	4.331	6.431	5.981	4.681	5.206	5.176	4.205	5.687	4.692	5.205	5.282	5.368	4.484	6.356	5.050
1989-91	5.162	4.238	6.361	5.664	4.566	5.212	5.072	4.067	5.634	4.453	5.058	5.173	5.437	4.340	6.310	4.914
1990-92	5.094	4.036	6.326	5.548	4.425	5.111	4.910	3.891	5.604	4.324	4.986	5.019	5.397	4.232	6.309	4.809
1991-93	5.007	3.910	6.292	5.674	4.297	5.096	4.786	3.684	5.434	4.198	4.858	4.922	5.414	4.039	6.334	4.660
1992-94	4.960	3.777	6.168	5.639	4.276	4.945	4.551	3.592	5.347	4.220	4.868	4.758	5.278	3.918	6.300	4.561
1993-95	4.854	3.807	6.034	5.491	4.214	4.845	4.428	3.581	5.269	4.256	4.826	4.589	5.137	3.777	6.132	4.401
1994-96	4.776	3.693	6.029	5.233	3.961	4.752	4.293	3.692	5.223	4.261	4.820	4.558	4.995	3.789	5.988	4.217
1995-97	4.697	3.595	5.991	5.274	3.899	4.622	4.283	3.750	5.183	4.177	4.737	4.566	4.957	3.771	5.895	4.085
1996-98	4.664	3.523	5.895	5.313	3.909	4.579	4.184	3.763	5.134	4.060	4.689	4.821	4.900	3.760	5.848	3.993
1997-99	4.664	3.520	5.957	5.396	4.108	4.508	4.246	3.702	5.137	3.921	4.592	4.825	4.968	3.743	5.919	3.970
1998-2000	4.691	3.557	5.961	5.496	4.156	4.558	4.281	3.665	5.189	3.870	4.549	4.853	4.989	3.866	6.023	3.959
1999-01	4.721	3.581	6.002	5.572	4.154	4.550	4.340	3.588	5.314	3.796	4.518	4.782	5.009	3.986	6.152	4.032
2000-02	4.699	3.632	6.024	5.546	4.120	4.582	4.291	3.554	5.332	3.762	4.484	4.832	4.881	4.045	6.109	3.999
2001-03	4.684	3.672	6.052	5.495	4.112	4.608	4.302	3.496	5.300	3.711	4.401	4.932	4.799	4.044	6.065	4.027
2002-04	4.579	3.597	5.751	5.348	4.106	4.644	4.218	3.584	5.130	3.697	4.374	4.698	4.690	3.884	5.955	3.846
2003-05	4.484	3.491	5.412	5.237	4.093	4.598	4.103	3.822	5.017	3.652	4.301	4.447	4.634	3.879	5.829	3.692
2004-06	4.385	3.396	5.268	5.129	4.078	4.484	4.033	4.050	4.913	3.586	4.307	4.102	4.592	3.796	5.709	3.517
2005-07	4.371	3.421	5.435	5.119	4.029	4.361	4.034	4.058	4.876	3.520	4.213	4.147	4.585	3.908	5.641	3.498

Source: Samples Registration System

Table 2: Age-specific marital fertility rates in India: 1985-2007

Period	15-19	20-24	25-29	30-34	35-39	40-44	45-49
1985-87	0.253	0.319	0.235	0.150	0.086	0.043	0.018
1986-88	0.256	0.319	0.231	0.144	0.084	0.041	0.016
1987-89	0.251	0.319	0.229	0.140	0.082	0.039	0.015
1988-90	0.248	0.315	0.224	0.135	0.080	0.038	0.015
1989-91	0.243	0.312	0.219	0.131	0.077	0.036	0.015
1990-92	0.246	0.312	0.213	0.125	0.074	0.035	0.015
1991-93	0.242	0.311	0.209	0.122	0.070	0.034	0.013
1992-94	0.242	0.312	0.207	0.123	0.066	0.032	0.010
1993-95	0.226	0.309	0.207	0.124	0.063	0.032	0.010
1994-96	0.217	0.306	0.206	0.124	0.062	0.031	0.010
1995-97	0.207	0.303	0.206	0.120	0.061	0.032	0.011
1996-98	0.214	0.301	0.203	0.115	0.059	0.029	0.011
1997-99	0.221	0.302	0.202	0.112	0.059	0.028	0.010
1998-2000	0.227	0.306	0.202	0.109	0.058	0.026	0.010
1999-01	0.231	0.313	0.202	0.108	0.057	0.025	0.009
2000-02	0.231	0.319	0.201	0.104	0.054	0.023	0.008
2001-03	0.236	0.322	0.198	0.100	0.051	0.022	0.008
2002-04	0.236	0.314	0.194	0.096	0.047	0.020	0.008
2003-05	0.234	0.312	0.187	0.094	0.042	0.019	0.008
2004-06	0.235	0.303	0.184	0.090	0.039	0.018	0.008
2005-07	0.239	0.309	0.181	0.086	0.037	0.016	0.006

Source: Sample Registration System

Table 3: Average annual proportionate change in the age specific marital fertility rates in India and states: 1985-2007

Country/ State	15-19	20-24	25-29	30-34	35-39	40-44	45-59
India	-0.004	-0.001	-0.011	-0.024	-0.038	-0.044	-0.043
Andhra Pradesh	-0.001	-0.002	-0.032	-0.072	-0.104	-0.123	-0.158
Assam	-0.000	-0.008	-0.013	-0.019	-0.032	-0.046	0.025
Bihar	-0.006	0.004	-0.004	-0.012	-0.027	-0.028	-0.036
Gujarat	0.009	-0.008	-0.010	-0.022	-0.032	-0.041	-0.038
Haryana	0.002	0.003	-0.018	-0.041	-0.056	-0.065	-0.066
Karnataka	-0.002	-0.003	-0.019	-0.046	-0.078	-0.102	-0.115
Kerala	-0.004	-0.008	-0.008	-0.008	-0.034	-0.088	-0.121
Madhya Pradesh	-0.002	0.004	-0.007	-0.022	-0.036	-0.042	-0.040
Maharashtra	-0.012	-0.005	-0.023	-0.042	-0.056	-0.069	-0.061
Orissa	-0.010	-0.005	-0.011	-0.021	-0.032	-0.041	-0.038
Punjab	0.012	-0.004	-0.017	-0.042	-0.071	-0.081	-0.064
Rajasthan	-0.009	0.005	-0.008	-0.025	-0.036	-0.036	-0.044
Tamil Nadu	-0.010	-0.001	-0.008	-0.026	-0.047	-0.069	-0.095
Uttar Pradesh	-0.001	0.007	-0.002	-0.015	-0.024	-0.029	-0.035
West Bengal	-0.003	-0.011	-0.030	-0.051	-0.077	-0.083	-0.087

Source: Author's calculations

Table 4: Estimates of parameter α for India and states: 1985-2007.

Period	India	Andhra Pradesh	Assam	Bihar	Gujarat	Haryana	Karnataka	Kerala	Madhya Pradesh	Maharashtra	Orissa	Punjab	Rajasthan	Tamil Nadu	Uttar Pradesh	West Bengal
1985-87	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1986-88	0.021	0.040	0.003	0.014	-0.004	0.034	0.032	0.041	0.025	0.047	0.011	0.077	0.043	0.032	0.019	0.001
1987-89	0.022	0.081	-0.011	0.005	-0.017	0.038	0.046	-0.022	0.014	0.045	0.018	0.098	0.076	-0.000	0.010	-0.005
1988-90	0.036	0.101	0.013	0.015	0.003	0.069	0.064	-0.033	0.034	0.043	0.019	0.107	0.085	0.006	0.003	0.026
1989-91	0.046	0.124	0.038	0.024	0.034	0.104	0.091	-0.057	0.036	0.001	0.038	0.100	0.079	0.012	0.007	0.051
1990-92	0.074	0.115	0.091	0.038	0.056	0.169	0.125	-0.008	0.097	0.010	0.069	0.131	0.106	0.033	0.028	0.091
1991-93	0.081	0.192	0.111	0.043	0.027	0.169	0.134	-0.098	0.110	-0.004	0.066	0.172	0.134	-0.005	0.037	0.110
1992-94	0.080	0.225	0.069	0.004	0.014	0.164	0.071	-0.163	0.123	0.038	0.058	0.171	0.088	-0.006	0.008	0.098
1993-95	0.049	0.277	0.059	-0.037	-0.009	0.140	0.059	-0.138	0.105	0.053	0.003	0.138	0.023	-0.052	-0.028	0.098
1994-96	0.037	0.260	0.068	-0.071	-0.043	0.159	0.066	-0.078	0.094	0.094	-0.006	0.154	-0.030	-0.047	-0.057	0.125
1995-97	0.034	0.257	0.125	-0.027	-0.058	0.133	0.110	-0.076	0.098	0.100	-0.015	0.158	0.024	-0.067	-0.055	0.168
1996-98	0.065	0.242	0.134	0.020	-0.026	0.174	0.147	-0.148	0.127	0.096	0.017	0.293	0.053	-0.067	-0.017	0.204
1997-99	0.086	0.317	0.147	0.037	0.017	0.195	0.184	-0.236	0.134	0.083	0.063	0.296	0.090	-0.100	0.013	0.232
1998-2000	0.109	0.355	0.175	0.066	0.028	0.267	0.227	-0.325	0.145	0.097	0.075	0.388	0.114	-0.186	0.045	0.263
1999-01	0.128	0.427	0.197	0.068	0.064	0.300	0.233	-0.318	0.175	0.132	0.085	0.367	0.142	-0.111	0.066	0.293
2000-02	0.146	0.486	0.224	0.103	0.075	0.308	0.240	-0.399	0.200	0.161	0.050	0.402	0.160	-0.075	0.082	0.308
2001-03	0.176	0.592	0.256	0.121	0.101	0.357	0.259	-0.361	0.232	0.191	0.046	0.443	0.194	-0.026	0.097	0.337
2002-04	0.204	0.587	0.235	0.145	0.147	0.387	0.274	-0.343	0.224	0.236	0.085	0.450	0.222	-0.086	0.145	0.373
2003-05	0.223	0.537	0.187	0.145	0.210	0.433	0.296	-0.187	0.225	0.264	0.101	0.475	0.259	-0.054	0.187	0.418
2004-06	0.245	0.424	0.200	0.139	0.276	0.431	0.339	-0.094	0.231	0.265	0.142	0.455	0.297	-0.032	0.231	0.468
2005-07	0.271	0.417	0.297	0.187	0.308	0.447	0.367	-0.090	0.257	0.265	0.143	0.480	0.337	0.033	0.254	0.501

Source: Author's calculations

Table 5: Estimates of parameter β for India and states: 1985-2007.

Period	India	Andhra Pradesh	Assam	Bihar	Gujarat	Haryana	Karnataka	Kerala	Madhya Pradesh	Maharashtra	Orissa	Punjab	Rajasthan	Tamil Nadu	Uttar Pradesh	West Bengal
1985-87	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1986-88	1.015	1.021	0.971	1.015	1.008	0.996	0.988	0.978	1.015	0.983	1.027	0.972	1.007	1.031	1.004	1.007
1987-89	1.026	1.047	0.976	1.025	1.022	1.009	0.995	1.000	1.055	0.998	1.035	0.991	1.018	1.056	0.999	1.013
1988-90	1.021	1.084	0.947	1.050	1.023	1.019	1.017	1.014	1.059	1.033	1.039	1.055	1.018	1.089	0.997	1.021
1989-91	1.019	1.105	0.950	1.060	1.022	1.031	1.034	1.066	1.065	1.097	1.013	1.141	1.025	1.114	1.006	1.001
1990-92	1.017	1.119	0.925	1.068	1.035	1.000	1.061	1.131	1.045	1.113	1.021	1.123	1.020	1.156	0.999	1.002
1991-93	1.030	1.121	0.939	1.100	1.055	1.016	1.072	1.204	1.061	1.116	1.036	1.096	1.047	1.190	1.011	1.001
1992-94	1.080	1.148	0.915	1.127	1.088	1.030	1.107	1.266	1.040	1.099	1.029	1.096	1.034	1.178	1.007	1.040
1993-95	1.094	1.169	0.886	1.157	1.077	1.056	1.121	1.201	1.056	1.081	1.036	1.090	1.055	1.175	1.017	1.068
1994-96	1.095	1.242	0.870	1.158	1.081	1.068	1.161	1.180	1.050	1.086	1.053	1.070	1.043	1.192	1.016	1.100
1995-97	1.071	1.336	0.893	1.183	1.073	1.088	1.214	1.184	1.111	1.089	1.103	1.087	1.083	1.244	1.036	1.145
1996-98	1.075	1.459	0.913	1.162	1.091	1.111	1.233	1.282	1.109	1.118	1.110	1.107	1.092	1.292	1.039	1.145
1997-99	1.088	1.412	0.915	1.151	1.095	1.119	1.266	1.350	1.131	1.144	1.098	1.235	1.104	1.316	1.058	1.148
1998-2000	1.090	1.416	0.918	1.140	1.107	1.111	1.265	1.408	1.109	1.161	1.088	1.218	1.116	1.409	1.062	1.124
1999-01	1.106	1.408	0.955	1.171	1.094	1.105	1.297	1.377	1.127	1.145	1.111	1.272	1.113	1.339	1.072	1.150
2000-02	1.122	1.468	0.982	1.187	1.115	1.123	1.319	1.448	1.141	1.125	1.159	1.266	1.139	1.328	1.080	1.200
2001-03	1.128	1.466	0.984	1.196	1.131	1.137	1.364	1.414	1.162	1.121	1.186	1.259	1.135	1.321	1.084	1.245
2002-04	1.121	1.473	0.914	1.138	1.136	1.120	1.386	1.419	1.152	1.146	1.104	1.242	1.134	1.333	1.079	1.231
2003-05	1.121	1.464	0.896	1.126	1.091	1.136	1.351	1.341	1.154	1.155	1.077	1.163	1.118	1.323	1.092	1.195
2004-06	1.125	1.530	0.882	1.111	1.079	1.161	1.366	1.317	1.130	1.195	1.072	1.131	1.099	1.305	1.101	1.185
2005-07	1.164	1.606	0.916	1.172	1.069	1.275	1.383	1.327	1.166	1.231	1.131	1.115	1.131	1.342	1.147	1.241

Source: Author's calculations

Table 6: Mean age at child bearing of currently married women in India and states: 1985-2007.

Period	India	Andhra Pradesh	Assam	Bihar	Gujarat	Haryana	Karnataka	Kerala	Madhya Pradesh	Maharashtra	Orissa	Punjab	Rajasthan	Tamil Nadu	Uttar Pradesh	West Bengal
1985-87	26.13	24.66	25.27	28.27	25.79	25.70	24.80	23.38	26.50	24.42	25.29	25.23	27.50	23.35	27.99	25.33
1986-88	25.97	24.39	25.34	28.14	25.79	25.54	24.71	23.30	26.32	24.28	25.15	24.97	27.22	23.10	27.86	25.31
1987-89	25.93	24.15	25.38	28.18	25.81	25.48	24.62	23.49	26.24	24.24	25.09	24.82	26.99	23.16	27.92	25.31
1988-90	25.87	23.93	25.34	28.05	25.70	25.30	24.46	23.48	26.13	24.13	25.07	24.61	26.94	23.03	27.98	25.12
1989-91	25.82	23.76	25.19	27.99	25.56	25.11	24.28	23.38	26.09	24.11	25.06	24.41	26.96	22.95	27.93	25.06
1990-92	25.69	23.76	25.00	27.87	25.43	24.89	24.06	22.99	25.82	24.04	24.88	24.34	26.80	22.76	27.82	24.87
1991-93	25.60	23.46	24.84	27.75	25.50	24.85	23.98	23.05	25.70	24.10	24.84	24.26	26.57	22.80	27.74	24.77
1992-94	25.45	23.27	25.14	27.91	25.47	24.84	24.17	23.09	25.69	23.98	24.91	24.29	26.86	22.85	27.92	24.71
1993-95	25.56	23.02	25.28	28.06	25.62	24.90	24.21	23.22	25.74	23.98	25.15	24.44	27.17	23.03	28.09	24.61
1994-96	25.62	22.90	25.30	28.26	25.76	24.81	24.07	23.06	25.82	23.81	25.15	24.40	27.49	22.96	28.26	24.39
1995-97	25.72	22.70	24.89	27.94	25.86	24.88	23.75	23.01	25.64	23.81	25.04	24.35	27.10	22.87	28.18	24.06
1996-98	25.54	22.48	24.78	27.70	25.65	24.63	23.53	22.91	25.49	23.76	24.86	23.76	26.92	22.73	27.95	23.91
1997-99	25.40	22.36	24.71	27.63	25.47	24.51	23.30	22.98	25.40	23.75	24.69	23.49	26.69	22.79	27.73	23.77
1998-2000	25.28	22.24	24.60	27.49	25.39	24.21	23.14	23.11	25.40	23.64	24.65	23.21	26.53	22.75	27.54	23.70
1999-01	25.14	22.11	24.38	27.41	25.27	24.10	23.05	23.22	25.21	23.58	24.54	23.20	26.38	22.72	27.39	23.50
2000-02	25.02	21.87	24.16	27.16	25.16	24.05	22.99	23.27	25.06	23.56	24.57	23.11	26.23	22.63	27.26	23.33
2001-03	24.86	21.64	24.00	27.03	25.01	23.85	22.84	23.27	24.87	23.50	24.51	22.98	26.06	22.53	27.16	23.11
2002-04	24.74	21.63	24.29	26.98	24.78	23.74	22.75	23.14	24.94	23.23	24.58	23.00	25.92	22.68	26.89	23.02
2003-05	24.65	21.79	24.56	26.99	24.60	23.53	22.75	22.83	24.92	23.09	24.59	23.05	25.76	22.59	26.61	22.93
2004-06	24.54	21.96	24.55	27.06	24.35	23.48	22.58	22.55	24.95	22.96	24.40	23.18	25.61	22.59	26.34	22.78
2005-07	24.34	21.89	24.01	26.67	24.27	23.25	22.45	22.52	24.75	22.89	24.22	23.11	25.36	22.29	26.14	22.53

Source: Author's calculations